Mechanical and electrical parts list

CTN-BB CHASSIS

POS.	DESCRIPTION	CODE	SAFETY
1	CPT 14"	8230 090 09280	⚠
1	CPT 20" SAMSUNG A48ECR141X	8230 200 40210	⚠
1	CPT 20" PHILIPS A48EJN02X	9301 823 10361	⚠
1	CPT 21" SAMSUNG A51EER131X	8230 210 64050	⚠
1	CPT 21" PHILIPS A51EAL155X	8230 090 09290	⚠
2	DEGAUSSING COIL 14"	3130 108 21271	⚠
2	DEGAUSSING COIL 20" / 21"	3130 108 21262	⚠
3	LOUDSPEAKER 14" 25 OHMS	3130 100 60191	
4	LOUDSPEAKER 16 OHMS (TV 20 / 21)	3130 100 20401	
4	LOUDSPEAKER 8 OHMS (TV 20 / 21)	3130 100 60301	
5	REMOTE CONTROL MENU TXT	3130 108 21341	
5	REMOTE CONTROL MENU NO TXT	3130 108 21351	
5	REMOTE CONTROL BARS NO TXT	3130 108 21361	
5	REMOTE CONTROL BARS TXT	3130 108 21371	
6	LOOP AERIAL	3130 100 20482	
7	AERIAL	3130 100 20361	

Philips CPT 20"/21" can be replace by Samsung CPT 20"/21" or vice versa, modifying components (supplied together with CPT a Kit) according the following table.

	2445	3238
CPT 20" PHILIPS	deleted	deleted
CPT 20" SAMSUNG	470 pF	1R

	2446	3238
CPT 21" PHILIPS	9N1	deleted
CPT 21" SAMSUNG	8N2	2R

ANNEX 2 TO
SERVICE MANUAL
CTN-BB

This supplement refers to change of Microprocessor for Circuit Reference 7600.

Chassis type is changed from CTN to CTN-BB.

3130 105 2423.1

Contents
Page

Introduction

The main change on this Chassis to the previous CTN-AA type are the introduction of new Microprocessors for both - Text and Non Text Models.

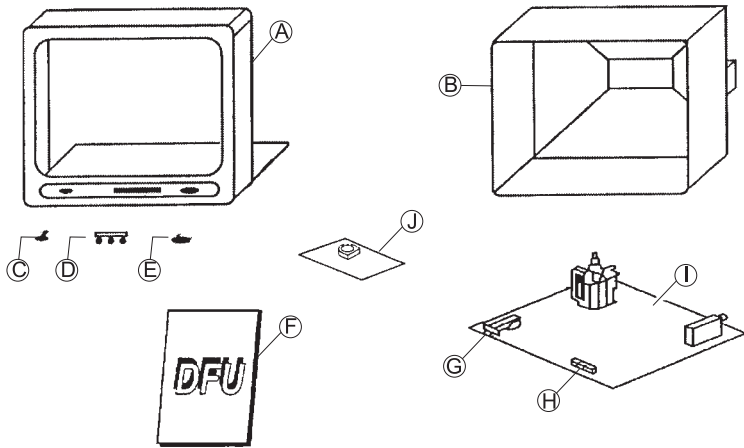Also the Flyback Transformer for 20″ ONLY MODELS has been changed.

The relevant Circuit Diagrams and PCB Layouts have been amended to show these changes, plus minor corrections/updates have been made to all other circuit information where this has been found necessary.

Page 16, 17 and 18 shows different Part Numbers for the Component changes on the new chassis.

Please use the original CTN Service Manual for all other parts information.

Mechanical Parts List

CTN-BB CHASSIS

POS.	DESCRIPTION	SECURITY
A	FRONT CABINET	⚠
B	BACKCOVER	⚠
C	MAINS KNOB	⚠
D	KNOB ASSEMBLY	
E	SENSOR COVER	⚠
F	OWNER'S MANUAL	⚠
G	MAINS SWITCH	⚠
H	MICRO SWITCH	
I	MAIN CHASSIS	⚠
J	CPT PANEL	⚠

NG-BLACK
BL-WHITE
GR-GREY
MA-IVORY
GO-DARK GREY
VE-GREEN
RS-PINK
RJ-RED
AZ-BLUE
PL-SILVER

POSITION	✳	SCREEN	✳	TV MODEL	✳	COLOUR

HOW TO ORDER

EXAMPLE: FRONT CABINET OF TV700TX COLOUR BLUE: *A * 14 * TV700TX * AZ*

PRINT BOARD LAYOUT

CIRCUIT DESCRIPTION

1.- SMALL SIGNAL PROCESSING (Diagram A)

The small signal is processed by TDA8361, (TDA8360 no scart) for Pal sets and TDA8362 for Pal/Secam sets (IC 7015), including IF detection, video processing, chroma decoder, RGB processing, sync processor and FM sound decoder.

1.1- IF detection (IC7015/6A)

- IF input (pins 45,46): The IF signal comes from pin 11 of the tuner to the IF SAW (Surface Acoustic Wave) filter (1015) and the IF-detector IC7015/6A (pins 45 and 46).
- IF filter (1015): The IF bandpass characteristic, determined by the SAW filter, is 33.4 to 38.9 MHz. for BG sets, 33.5 to 39.5 MHz. for PAL I sets and 32.4 to 38.9 MHz. for DK sets.
- IF oscillator (pins 2,3): Carrier frequency, present in coil L5040, is tuned at 38.9 MHz. for BG sets or 39.5 MHz for Pal I sets
- AGC voltage (pin 47): The AGC delayed voltage is applied to pin 1 of the tuner. It should be   adjusted for 1mV. antenna signal by means of R3021 (pin 49).
- AFC signal (pin 44): The Automatic Frequency Control is obtained from the reference signal of the IF-detector. C2037 smoothes the AFC voltage.
- Identification (pin 4): The identification output is applied to pin 16 of the µC. This signal is high in case of signal detected.
- Video output (pin 7) : This baseband CVBS signal with 2Vpp of nominal amplitude, also contains the FM intercarrier sound signal. Sound is filtered out by a ceramic trap (1032 or 1033) which frequency can be different depending on the system: 5.5 MHz. for BGLL', 6.0 MHz. Pal I or 6,5 MHz. for DK.

   Multistandard sets

   -The IC TDA8362 changes automatically between negative (BGIDK) and positive (LL') modulation. The IC also determines if the AGC circuit should control at the top white level of the video (positive modulation) or at the top sync level (negative modulation).
   -Saw filter (1015) bandpass characteristic is modified by BG/L switching signal proceeding from the microcontroller:
     - For BGIDK reception BG/L is low, D6014 does no conduct and the bandpass filter is tuned by 5012 and 2013 at 32.9MHz. to 38,9 MHz.
     - For LL' reception BG/L is high, D6014 conducts and so the bandpass filter is tuned by 5012 and C2014 at 32.4 to 38.9 MHz.
   -Oscillator frequency is controlled by the L/L' switching signal:
     -For BGIL reception L/L' is low, D6042 conduct and so coil 5043 is connected in parallel to 5040.
   - The circuit is tuned to 38.9 MHz.
   - For L' reception L/L' is high, D6042 does nor conduct and the circuit is tuned to 33.4 MHz. by L5040 only.

1.2- Source select, luminance and chroma separation (IC7015/6B)

- Source select (pin 13, 15, 16): The internal CVBS signal is now fed to pin 13 IC7015/6B. External CVBS from the pin 20 of Euroconnector is present on 15. The source selector switch between internal (pin 16 = 0V.) or external (pin 16 = 8V.).
- Luminance and chrominance separation: Chrominance signal is filtered out (-20dB) by a luminance notch filter which is internally calibrated at the subcarrier frequency (4.43MHz).

1.3- Chroma Decoding (IC7015/6C)

Pal or Secam signals are recognized automatically by the IC. For Pal signals decoding is made in IC7015/6C and for Secam signals in IC7250 (TDA8395).
- Pal signal: This signal is amplified and demodulated. The 4.43 MHz. reference crystal for chrominance demodulation is present at pin 35 of IC7015/6C. The R-Y and B-Y out-puts (pins 30, 31) are applied to chroma delay line IC7221 (TDA4665).
- Secam signal (pin 27): This signal is applied to pin 16 of Secam decoder IC7250.

- Secam reference (pin 32): Pal or Secam signals are recognized using a DC level by bi-directional communication line between this pin and pin 1 of IC7250.
   -If IC7015/6C has detected a Pal signal, Vpin 32 is made 1,5V. By then the demodulated R-Y and B-Y outputs (pins 30, 31) are applied to delay line IC7271.
   -If IC7015/6C has not detected a Pal signal, Vpin 32 is made 5V. By then the demodulated R-Y and B-Y at outputs (pins 30, 31) are not used.
   -If IC7250 has detected a Secam signal, Vpin 1 IC7250 becomes low, sinking typical 150µA. current from pin 32 (5V.) of IC7015/6C, which one detect this current to know that a Secam signal has been detected. In this case R-Y and B-Y signals are applied to the delay line IC7271 via outputs of IC7250 (pins 9 and 10).
This bi-directional communication line uses AC level to calibrate the 4,43MHz. between the PLL and chroma cloche filter of IC7250.

1.4- RGB-dematrixing(IC7015/6D)

- R-Y, B-Y inputs (pins 28, 29): The R-Y and B-Y signals come from delay line (IC7271) and the Y signal comes (internally) from IC7015/6B.
The sandcastle pulse coming (internally) from the IC7015/6E (pin 38) synchronizes RGB dematrixing and suppresses the RGB signals during line and frame flyback.
- Video controls (pins 17, 25, 26): These inputs for contrast, brightness and saturation can be adjusted from 0,5V to 4,5V by the µC. If beam current is limited reducing contrast with D6289 circuit.
- RGB inputs (pins 22, 23, 24): External RGB inputs come from Euroconnector and are switched by fast blanking.
- Fast blanking (pin 21): When voltage of pin 21 is 0,4V. internal RGB is used. For a pin 21 voltage between 0,4V. and 3,5V. the set switch to external RGB.
If voltage of pin 21 is 4V. both internal and external are deleted. The up uses this status to insert RGB signals from OSD generator directly to RGB outputs.
Fast blanking can switch signals for full screen (by a DC voltage) or for a part of the screen (by a pulse voltage).
- RGB outputs (pins 18, 19, 20): See RGB amplifier.

1.5- Horizontal synchro (IC7015/6E)

- Start up (pin 36): When the set is switched on, voltage at pin 36 rises and when exceeds 7V. the horizontal oscillator starts running at approx. 25 KHz. (slow start). After the line starts, main supply of IC7015 (pin 10) comes up to 8V. and the line frequency changes to 15625 Hz.
- Standby (pin 36): This pin is used also for standby function. In this case the voltage is reduced to 3V. by the uP and so the line is shut down.
- Hor. oscillator: This oscillator is fully integrated and internally calibrated. Frequency is obtained derived of chroma oscillator on pin 35 of IC7015/6C.
- Hor. sync separator: This circuit (fully integrated) separates hor. pulses of CVBS proceeding from 7051/6B.
- Oscillator synchro (pin 40): Oscillator is synchronized with video signal by a first control loop circuit. The control voltage is present at pin 39.
- Hor. phase control (pin 39): Line fly-back (pin 38) is synchronized with oscillator by a second control loop circuit. The control voltage is present at pin 39. Phase can be adjusted by 3354.
- Hor. output (pin 37): Oscillator is converted in square wave voltage at this pin.
- Sandcastle (pin 38): This pin is used as line fly-back input and also as sandcastle output. Levels of sandcastle pulse are 5,3V for burst detection, 3V. for line blanking and 2V. for frame blanking.

1.6- Vertical synchro (IC7015/6E)

- Vertical oscillator (pin 42): Frequency is obtained dividing frequency of chroma oscillator on pin 35 IC7015/6C. At pin 42 a sawtooth signal is present. Resistor 3342 is used to correct vertical amplitude with beam current.
- Vert. sync. separator: It separates frame sync. pulses from CVBS and so synchronizes frame oscillator.
- Vert. drive (pin 43): This out-put is used to drive the vertical amplifier (7400)
- Vert. feedback (pin 41): this feedback is proportional to deflection current and is used to correct the vert. drive signal.

2.- RGB AMPLIFIERS (diagram B)

- RGB inputs : The RGB signals available at pins 20, 19 and 18 of IC7015/6D are drived by emitter followers (7210, 7211, 7212), to RGB amplifiers.
- Reference voltage (7225): An internal reference voltage of 2.5V. is produced on the emitter of transistor 7225 to keep the black level stable.
- RGB amplifiers (7205, 7218, 7227): Signal is inverted and drived to the CPT by RGB amplifiers. To improve high frequency amplification there are small capacitors (2204, 2217 and 2230).
- Flash-over protections: Clamping diodes to +8V. (6203, 6216, 6229) and 1K5 series resistors (3203, 3216, 3229) are added for protect the circuit from CPT flash-over.
- White adjustment: The gain of B and G amplifiers can be adjusted by 3213 and 3214.
- Cut-off adjustment: The black level of the CPT can be adjusted by 3207, 3220, 3234 and Vg2.

3.- SOUND CIRCUIT (diagram C)

3.1- FM Sound detection (IC7015/6F)

- FM input (pin 5): FM sound is extracted from baseband video (CVBS) proceeding of IF detector and filtered through 1136 (5.5 MHz. for BG sets, 6.0 Mhz. for Pal I sets, 6.5 Mhz. for DK sets).
- FM demodulation: FM - mono sound demodulation takes place in IC7015/6F. No adjustment is required because demodulation is doing by an automatic PLL (4.2 to 6.8 MHz.).
- De-emphasis (pin 1): Sound frequency characteristic is defined by de-emphasis capacitor C2112 at pin 1.
- External FM audio out (pin 1): The signal at this pin is amplified by T7114 and T7115 to drive the euroconnector sound outputs (pins 1,3).
- External FM audio in (pin 6): External audio proceeding of euroconnector (pins 2,6) is applied to this pin. Selection between internal or external is done by pin 16 of IC7015/6B.
This output is drived to pin 3 of the final sound amplifier IC7187 (TDA7052 or TDA7056).

Multistandard sets:
-FM demodulation: This function is done in the same way that no multi sets. The only difference consist of a second Pal I 6MHz. filter (1135) in addition to the 5,5MHz. BG filter (1136). 6MHz. filter is switched off for BG reception by transistor 7170 depending on BG/I signal.
-AM demodulation: In Multistandard sets, also AM demodulation for LL' systems is necessary. AM sound is extracted directly from the tuner instead of from baseband video.

AM Sound detection (IC7125)
- AM input (pins 1,16): AM signal at 32,4MHz. for L system or 39,9MHz. for L', is removed from IF signal coming from tuner by SAW filter 1137 (double band pass characteristic). Sound is switched by T7126, D6115, TS7127 and D6116 depending on L/L' signal: For L' reception (L/L' is high) IF signal is present at pin 1, and For L reception, IF signal is present at pin 2.
The required frequency spectrum is fed to pins 1 and 16 of the AM demodulation IC7125.
- AGC (pin 3,5): C2126 and 2127 are AGC related storage capacitors.
- AM Sound output (pin 6): The demodulated signal at pin 6 of IC7125 is supplied to the source selection switch (pins 1, 5 IC 7140).

AM Sound switching (IC7140)
- External audio out (pin 15): Audio out is selected between AM sound (pin1) or FM sound (pin2) by internal switch depending on BG/L signal (pin 10).
- Audio in (pins 3, 4, 5): Top switch in IC7140 select between internal AM sound (pin 5) and EXT sound from SCART (pin3) by INT/EXT signal (pin 9). The output of this selector (pin 4) is fed to input pin 6 of FM demodulator (IC7015/6F).
- Internal AM audio switching (pin 13): This pin is switched to 8V when the set is in L or L' system (AM sound). Then, pin 1 of IC7015/6F is 8V. and this IC switches internally its sound input from pin 5 to pin 6, where AM sound is present. (Sound proceeding from pin 4 of IC7140 can be internal AM or external).
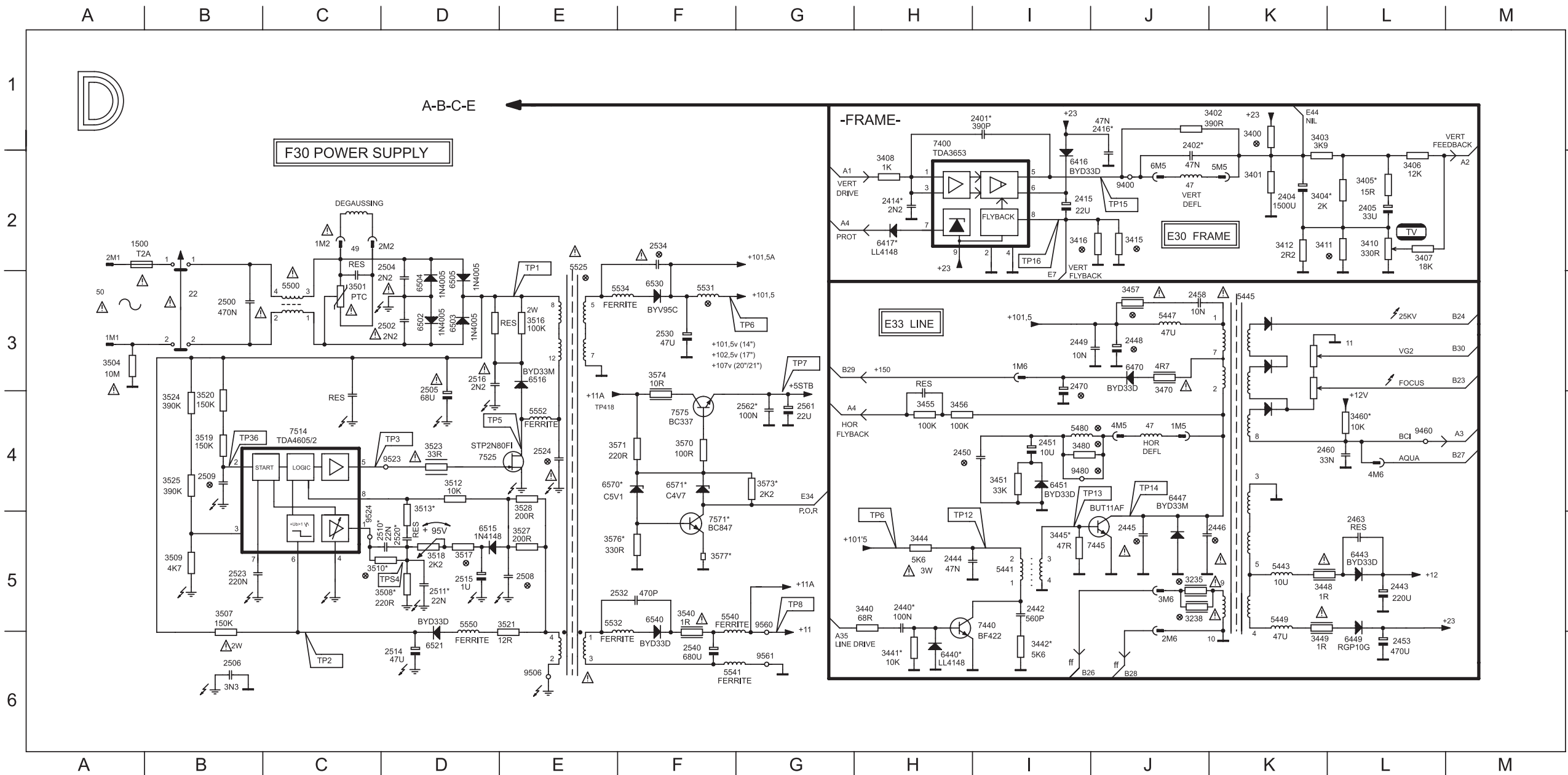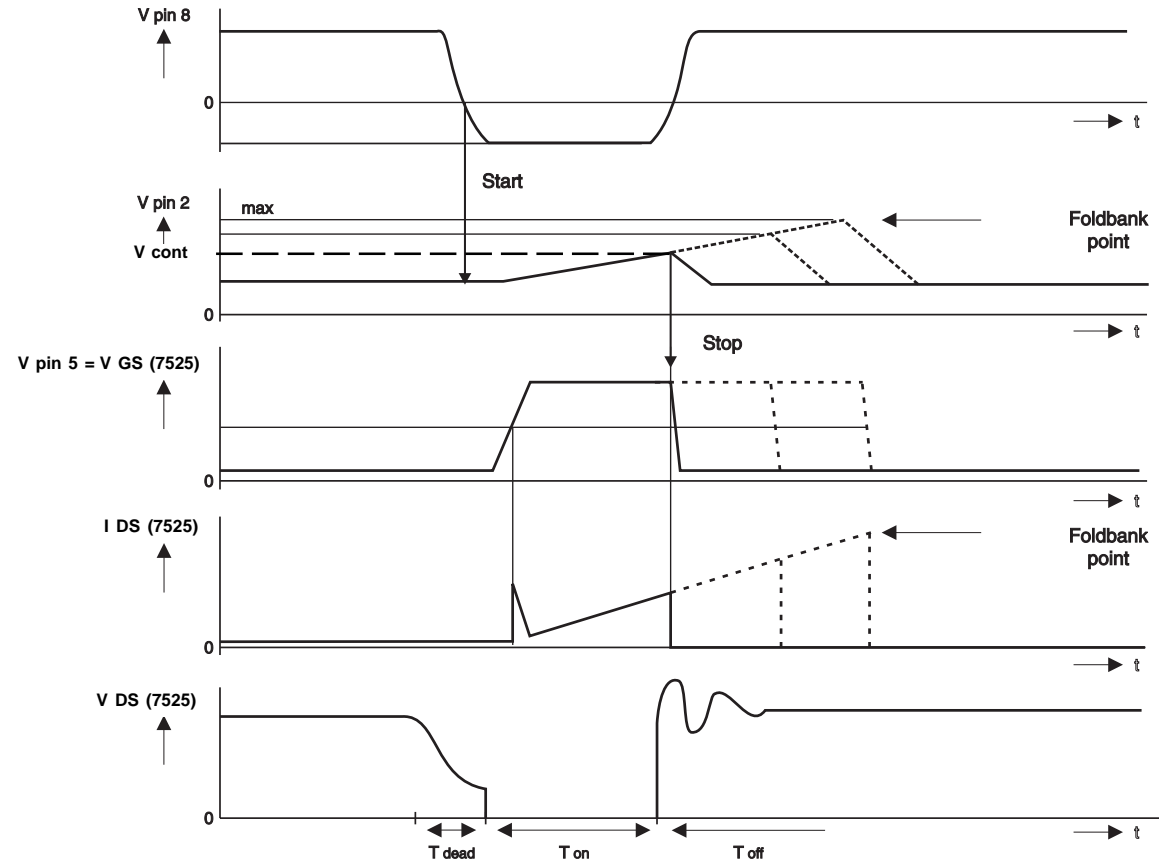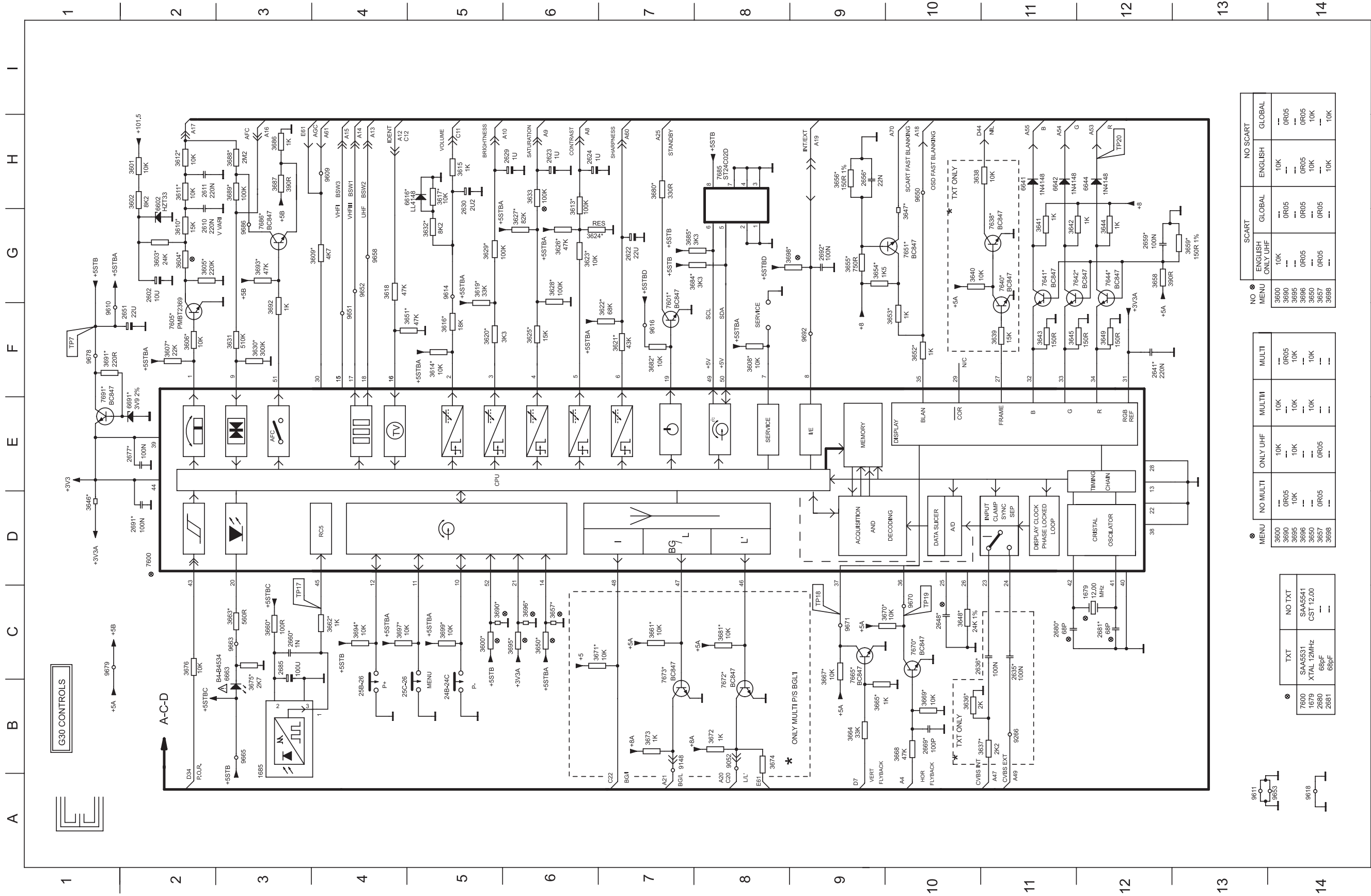
PRINT BOARD LAYOUT

4.3- Protections

- Overload protection (pin 2): This is produced if T-on is increased till Vpin 2 voltage reaches the foldback point (see signals 4.5). The IC will switch into overload mode (off and on continuously).
- Output voltage protections (pin 6): Limiting values of Vpin 6 voltage (7.25 and 16V.) provide under and overvoltage protections for the circuit.
- Mains overvoltage (pin 3): The voltage at pin 3 IC7515 is a measure for the mains voltage and so the DC voltage across C2505. As soon as the voltage Vpin 3 reaches 6.6V. the supply will stop running.

4.4- Secondary side

- Line supply: The value to adjust the supply is 101,5V. for 14" CPT'S, 102,5V. for 17" CPT'S and 107V. for 20"/21" CPT'S. This supply is also used to obtain the +33V. varicap voltage by D6602.
- Auxiliary supply (+11V.): This supply is used for sound output amplifier, for start up the line circuitry and for the stand by of the microprocessor. +5STB is regulated by T7525 and D6575. A +5V. power on reset signal (POR) is obtained during start up by R3573 till T7571 conducts by D6570.
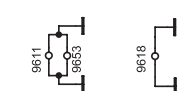
4.5- Power supply signals

	1W	3W
1540	630MA	1A
7187	TDA7052	TDA7056

	PAL BG	PAL-I	PAL/SECAM BG-DK	PAL/SECAM BG-L-L'	PAL/SECAM BG-L-L'-I
1001	UV1315	UV1343	UV1315	UV1315	UV1315
1015	G1961	J1951	G1961	K3953	G3957
1032	5.5MHz	---	5.5MHz	5.5MHz	5.5MHz
1033	---	6.0MHz	6.5MHz	---	6.0MHz
1135	---	6.0MHz	6.5MHz	---	6.0MHz
1136	5.5MHz	---	5.5MHz	5.5MHz	5.5MHz
2002	---	---	---	5P6	5P6
2017	47U	47U	47U	100U	100U
2025	2U2	47U	2U2	4U7	4U7
2152	---	---	---	10U	10U
3010	0R05	0R05	0R05	68R	68R
3019	150R	150R	150R	3K6	3K6
3152	0R05	0R05	0R05	---	---
3173	---	---	0R05	---	620R
3604	150R	150R	150R	22R	22R
5010	1U2	1U2	1U2	0U56	0U56
5040	0MUH19	0MUH19	0MUH19	0MUH3	0MUH3
6020	---	---	---	2V4	2V4
6170	---	---	0R05	---	620R
7015	TDA8360/1	TDA8360/1	TDA8362	TDA8362	TDA8362
9111	JMP	JMP	JMP	JMP	---
9156	JMP	JMP	JMP	---	---

	14	17	20 PH	21 PH	20 SAM	21 SAM
2445	---	220P	---	---	470P	---
2446	8N2	8N2	9N1	9N1	9N1	8N2
2448	10U	47U	47U	47U	47U	47U
2450	470N	330N	330N	470N	330N	470N
2470	10U	22U	22U	22U	22U	22U
3238	---	---	---	---	1R	2R
3400	2K4	2K4	2K4	2K4	2K4	2K4
3401	2K4	1K2	1K2	1K2	1K2	1K2
3480	---	1K2	1K2	1K2	1K2	1K2
5500	CU15	AT4042	AT4042	AT4042	AT4042	AT4042
9480	JMP	CU15	CU15D3	CU15D3	CU15D3	CU15D3

	14/17"	20/21"		14/17"	20/21"
2202	22N	100	3235	1R	2R
2204	330P	470P	3244	430R	360R
2206	1U	10U	3289	8K2	15K
2217	330P	470P	3404	2K	2K7
2230	270P	470P	3407	18K	12K
2237	15N	33N	3412	2R2	1R5
2508	6N8	3N9	3415	2K2	1K5
2509	3N9	3N3	3416	2K2	1K5
2524	1N	470P	3457	27R	47R
2534	1N	---	3510	750R	1K2
3208	430R	360R	3517	6K2	5K6
3221	430R	360R	5445	LOT 14	LOT 20
3222	560R	360R	5525	SOPS 14	SOPS 20
3225	3K3	3K9	5531	9X3,5	SPT0508A

3.2- Sound amplifier (IC7187)

Sound amplifier can be TDA7052 for 14" and 17" models or TDA7056 for 20" and 21" models.
Amplified sound is drived to the headphones output and loudspeakers. If headphones are connected, loudspeakers are switched off.
Volume control on DC level is present at pin 4 for TDA7052 or pin 5 for TDA7056.

4.- POWER SUPPLY (Diagram D)

Mains isolated switched mode power supply (SMPS), controlled by IC7514 (TDA4605) in variable frequency mode.

- **Switching behaviour**: The switching period is divided in on-time, when energy is extracted from the mains into the primary winding (8-12 of 5525), off-time, when energy in the transformer is supplied to the loads via secondary windings of 5525 and dead when no energy is extracted or supplied.
- **Standby mode**: Output voltages are present when the set is on stand by, due to standby is done cutting line deflection. On-time is lower and power consumption is very low.

4.1- Primary side

- **Degaussing**: R3501 is a dual PTC (2 PTC's in one housing). After switch on set, PTC is cold so low-ohmic and so degaussing current is very high. After degaussing, PTC is heated so high-ohmic, so in normal operation degaussing current is very low.
- **Rectifier**: Mains voltage is filtered by L5500, full wave rectified by diodes D6502-D6503-D6504-D6505 and smoothed by C2505 (300V. DC for 220V AC mains).

4.2- Control circuit (IC7514)

- **Start up and supply (pin 6)**: When the set is switched on, a current via R3507 is applied to pin 6. When C2514 is charged to 15V. the power supply starts and a current from pin 5 to T7525 is drived. T7525 starts conduction and a voltage across transformer windings is built up. The voltage across winding 4-2 is rectified by diode D6521 and used to supply the IC on pin 6.
- **Soft start (pin 7)**: The capacitor C2523 causes a slow increase of the duration of the output pulse during start up.
- **IC output (pin 5)**: This output drives T7525. R3523 is a fuse resistor to protect IC from short circuits in T7525. D6516 limits the maximum voltage in T7525.
- **Start conduction of T7525 (pin 8)**: A voltage proceeding from winding 4-2 is applied to this pin. The zero crossing detector recognizes the complete discharge of the energy stored in the transformer core, in addition to a dead time depending on C2508. This circuit guarantee that T7525 starts conduction at minimum Vds voltage (see signals 4.5 pag 13).
- **Primary current info (pin 2)**: Current primary winding is simulated by a pin 2 voltage.
- **Output voltage info (pin 1)**: The voltage across winding 4-2 is rectified by diode D6515, divided by R3527, R3518 and R3508 and applied to pin 1. Internal control voltage (Vcont) inversely proportional to V pin 1 is generated. Tipical Vpin1 = 400 mV.
- **Output regulation (pins 1, 2, 8)**: IC7514 stabilizes output voltage by controlling T-on and so the frequency and the duty cycle:
  Start pulse to T7525 is determined by pin 8 circuit (see signals 4.5 page 13).
  Then a sawtood voltage Vpin 2 is generated at pin 2. Stop pulse to T7525 is produced when Vpin 2 reaches Vcont.
  Output control is done by the following way:
    If output is higher, Vpin 1 is higher, Vcont is lower, T-on and output will be reduced.
    If output is lower, output will be increased.
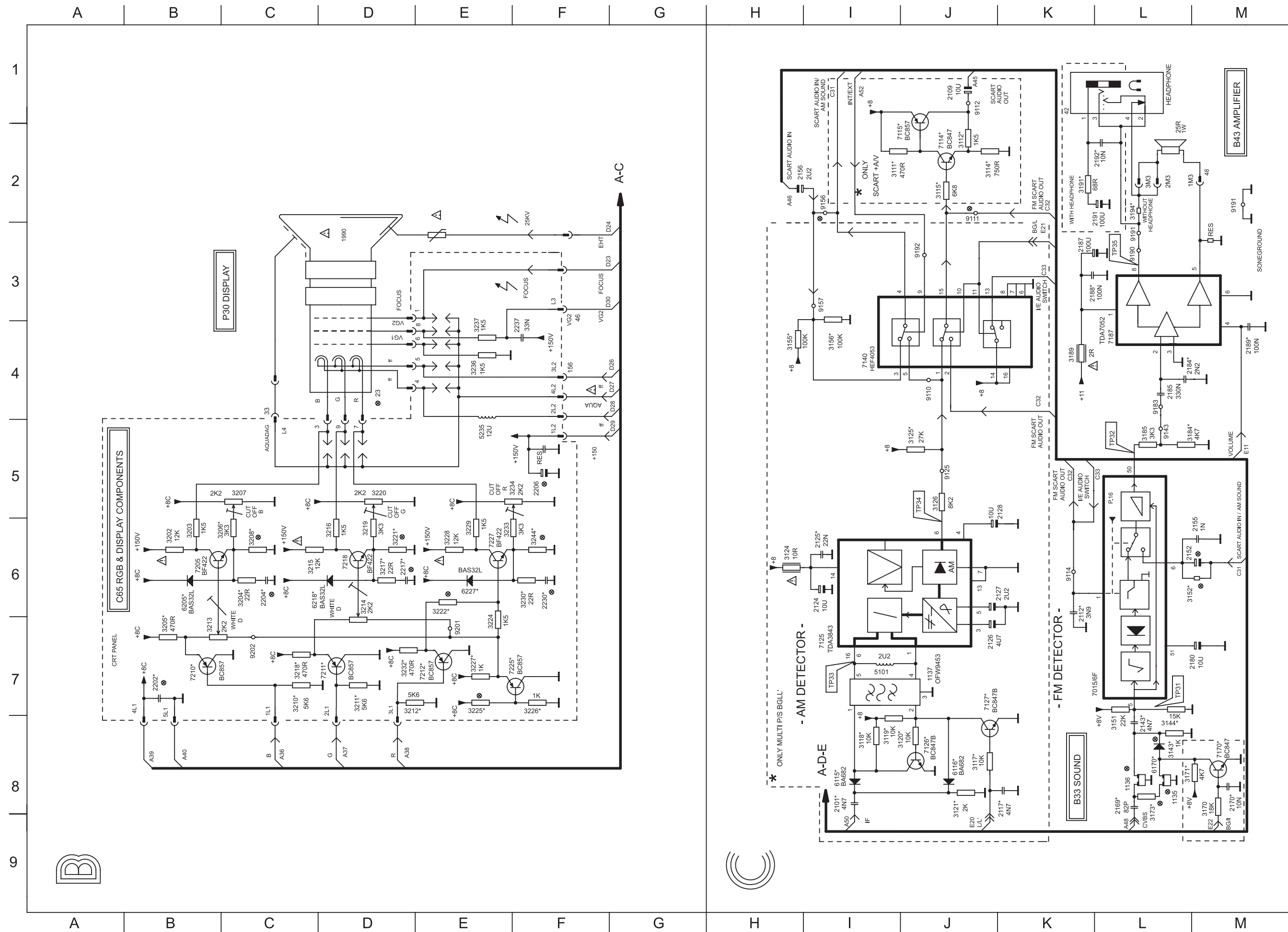 Output voltage of supply can be adjusted by R3518.
  Mains voltage variation is stabilized in the following way:
    If mains voltage is higher, slope in the sawtood voltage Vpin 2 is higher, stop point is reached before and T-on is reduced.
    If mains voltage is lower, T-on is increased.

5.- DEFLECTION (Diagram E)

5.1- Frame deflection

This function is performed by the integrated circuit TDA3653 (7400).

- **Frame supply (pins 6, 8, 9)**: Pin 9 is used to supply the IC except output stage which one is supplied by pin 6. At pin 6 there is a higher voltage during flyback time. This is produced adding the flyback signal present at pin 8 to a +25V. supply by D6416 and C2415. Pin 8 is also used to drive vertical flyback input at pin 37 of the up. (IC 7600)
- **Vertical input (pins 1, 3)**: The input circuit is driven by pin 44 of IC7015/6E. Vertical signal is amplified and inverted.
- **Vertical output (pin 5)**: Vertical output is applied to deflection coil. DC current is suppressed by C2404. A voltage proportional to current deflection is present in R3411/12 and a feedback of it is sent to pin 42 of IC7015/6 by 3407, so that amplitude can be adjusted by 3410. DC feedback is present in R3406. Linearity is corrected by the network around C2405.
- **TRC protection (pin 7)**: When frame deflection is broken down, the tube is protected blanking all the picture by pin 7 output.

5.2- Line deflection

The final line transistor is driven by the transformer 5441, whose primary winding is driven by the transistor T7440 connected to the line drive output of IC7015/6E.
The horizontal deflection stage is carried out in a conventional way, with the deflection transistor (T7445) and line transformer (5545).
Beam current info (BCI) is present at C2460.
There are the following auxiliary supply voltages obtained from line transformer (5545):
  +25V.: To supply frame deflection..
  +12V.: To obtain +8V. by IC7016 (diagram A) for small signal, +5V. by T7001 (diagram A) for the tuner and for the microcontroller.

6.- MICROCONTROLLER/TEXT (Diagram E)

The CTN-BB chassis is designed to accept 2 different microcontrollers: SAA5531 and SAA5541.
Both microcontrollers are mounted in the same position (7600), and the associated circuitry is the same.
The ROM of the ICs contain an specific program that assures all the functions of the appliance, including a MENU to control the set is (see Instructions Manual).
For no TXT sets SAA5541 is used.
For TXT sets SAA5531 is used which one also contains a teletext decoder, including the following functions: TXT on/off, reveal, freeze, temporary cancellation, clock, subcode, zoom, index, flof, page +/-, X/26 and 8/30 packet decoding (station identification and start-up page).

Following there is an explanation of the different functions of the microcontroller indicating pins number assigned:

- **Power supply (pins 31, 39, 44)**: The IC has several +3,3V power supplies, analog (pin 31), core (pin 39), and periphery (pin 44). All supplies are present during stand by.
- **P.O.R. (pin 43)**: POR (power on reset) is activated when the set is switched on (see 4.4 pag 13). If the system shows abnormal behaviour it is important to reset it switching off/on the set. Reset can be produced also connecting pin 43 to +5V. for an instant.
- **LED (pin 20)**: The LED (6663) lights up with a low current when the television set is ON and with a high current when the set is on Standby. While the set is receiving a remote control signal, the led is blinking.
- **RC5 (pin 45)**: The commands transmitted by the remote control handset are received by infrared receiver (1685) and passed to the microcontroller for decoding.
- **Control keys (pins 10, 11, 12)**: When a control key is activated, the correspondent pin is connected to ground.

- **I2C bus (pins 49 and 50)**: The microcontroller is connected to non-volatile memory IC7685 (EEPROM) via bus I2C. Personal preferences (PP) and channel data are stored in the memory. The system can store 79 channels (with the data on tuning voltage and band) and personal preference.

- **Service (pin 7)**: If this pin is connected to earth when the set is switched on, the unit will go into Service Default Mode (see Repair Facilities in chassis CTN Service Manual).

- **Options (pins 14, 21, 52)**: While start up, the microcontroller checks option pin voltages to know the special features of this chassis. This one is implemented changing the associated components of these pins. Different options (menu, multistandard, etc.) can be seen on tables of diagram E.

- Multistandard out-puts (pins 46, 47, 48): These signals are only used on multistandard units, for switching the system for decoding sound and video. Signals from pins 46 and 47 are inverted and set at the correct level by transistors 7672 and 7673, respectively. After they are inverted together with the signal from pin 48, they make up the system status lines: BG/I is high for Pal I system, BG/ L is high for L and L' systems and L/L' is high for L' system.

- **OSD synchronization (pins 36, 37)**: In order to synchronize the OSD and the TXT information with the picture signal, the VERT FLYBACK signal (pin 37) and HOR FLYBACK signal (pin 36) are added in inverted form to the integrated circuit. Due to this if the video signal is lost, the TXT keeps synchronism. - Video inputs (pins 23 and 24): These inputs are only used on TXT sets. The teletext information is extracted from the video signal inserted on pins 23 (internal video) and 24 (external video), depending on status of INT/ EXT (pin 8).

- **Oscillator (pins 41 and 42)**: A 12-MHz. oscillator is determined by a 12-MHz. crystal between pins 41 and 42.

- **Tuning (pins 1, 9, 16, 51)**: The unit has a VST (Voltage Synthesized Tuning) system. This system works by tuning to a station on the tuner through a linear variation of the tuning voltage (V-VARI) from 0V. to 33V. applied on pin 2 of the tuner. It is generated on pin 1 of the uP and converted to an adequate level for the tuner using T7605. The AFC signal (Automatic Frequency Control) of IF detector is added to the tuning voltage V-VARI by R3689 and R3688 to compensate for the slow variation of the tuning feature.

While searching for the station, pin 51 is set on high, which means that the AFC voltage will not be added to the V-VARI. If an IDENT signal is received on pin 16 while searching for a station, the uP stop searching and checks via input pin 9 if the tuning is correct and whether the AFC signal can be activated again.

- **AGC auto tuning** (pin 30): This pin is used to limit the AGC voltage in automatic tuning so that noise signals are not memorized.

- **Band switching (pins 15, 17, 18)**: There are 3 outputs for band switching pin 15 for VHFI, pin 17 for VHFIII and pin 18 for UHF. The uP controls the channel band in the tuner by a voltage of +5V. at the correspondent output.

- **Picture and sound adjustments (pins 2, 3, 4, 5, 6)**: Volume control (pin 2), brightness control (pin 3), colour control (pin 4), contrast control (pin 5), and sharpness control (pin 6).
The RC networks are used to convert the modulated pulse output to a DC voltage level. These settings can be pre-programmed in the memory as a personal preference (PP). Mute is controlled internally on the up during automatic station search or when the signal received is interrupted (detected via the IDENT signal on pin 16).
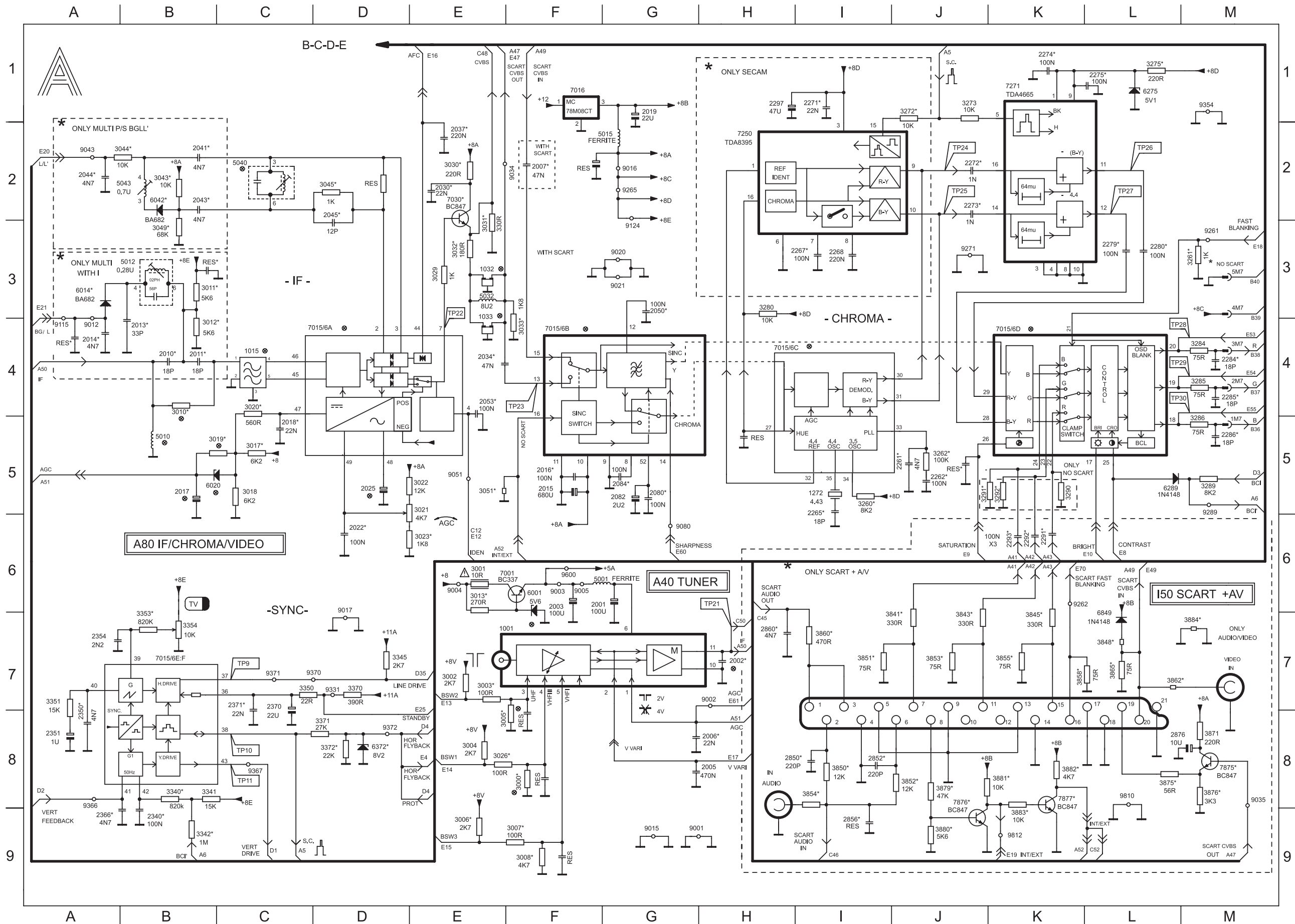
- **INT/EXT (pin 8)**: When this output is 0V. the set is switched to external via transistor (7877). This signal is added to the signal from pin 8 of Euroconnector, so that either of them can be used to switch to external. This line is also used by the microcontroller as an input line, to switch the adequate video input (internal or external) used for decoding TXT.

- **Standby (pin 19)**: When this output is high, the set is switched to stand by. The start-up voltage of the TDA8361A (pin 36) is reduced and the line oscillator stops.

- **Fast blanking (pin 35)**: This pin is used for delete the video picture signal while RGB insertion is produced.

- **NIL (Pin 27)**: This control signal is used (only on TXT sets), to eliminate interlacing for TXT signals. It is applied to the vertical deflection by switching transistor 7640.

- **RGB outputs(pins 32, 33, 34)**: The RGB outputs are used for On-Screen Display (OSD) and also for TXT (TXT character set is used for both functions). RGB signals are applied trough common base amplifiers (7641, 7642, 7644) to RGB outputs of 7015 (pins 20, 19, 18).